UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MATERIAL SPECIFICATION

MS-203: "CONCRETE"

203.1 SCOPE

This specification governs the quality of concrete mixes.

203.2 QUALITY

Concrete mixes shall be composed of Portland cement, fine and coarse aggregate and water. An air-entraining admixture may be used.

a. Portland cement shall conform to the requirements of Material Specification MS-202.

b. Fine and coarse aggregates shall conform to the requirements of Material Specification MS-201. The aggregates shall be handled in a manner to prevent contamination and segregation.

c. Water shall be clean and free from harmful chemicals (suitable for drinking).

d. Air-entraining admixtures shall conform to the requirements of ASTM C-260, Air Entraining Admixtures for Concrete.

e. Class F fly ash meeting ASTM C-618 may be used in the concrete mix to replace not more than 15% of the cement by weight. An independent testing laboratory shall test pozzolanic materials with test results included with the submittal of design mix.

f. Water-reducing and set-retarding admixtures may be used upon satisfactory submission of test results using a trial mix design and manufacturer's certification of the admixture. The admixtures shall conform to ASTM C-494.

g. The concrete mix shall indicate evidence of meeting or exceeding the following criteria unless otherwise shown on the drawings.

(1) Minimum strength: 3000 lb.

(2) Slump: ASTM C-143, 3-5 inches.

(3) Cement: ASTM C-150, Type I, IA, II, IIA, V or VA.
Minimum content: 6 sacks per CY concrete (94 lb. sacks).

(4) Water: Clean potable and free of foreign matter.
Maximum water-cement ratio; 0.45 - 0.55 (6 gallons per sack of concrete).

(5) Aggregates: Clean durable and within the grading limits of ASTM C-33.

Coarse Aggregates; maximum size shall be 3/4 inch unless otherwise stated on the drawing.

Fine Aggregates; fineness module shall be greater than 2.3 but less than 3.1.

Fine to Total Aggregate Ratio; greater than 0.35 but less than 0.45.

(6) If Air Entrained, concrete mixes shall have 5-8% volume of air using an air entraining admixture.

203.3 INSPECTION AND TESTING

The following is a partial listing of the common American Society for Testing and Materials, ASTM, test requirements for concrete that may be used to verify concrete quality:

a. ASTM C-31, "Making and Curing Concrete Compressive and Flexure Strength Test Specimens in the Field."

b. ASTM C-33, "Concrete Aggregates."

c. ASTM C-39, "Compressive Strength of Cylindrical Concrete Specimens."

d. ASTM C-94, "Ready-Mix Concrete."

e. ASTM C-143, "Slump of Portland Cement Concrete."

f. ASTM C-150, "Portland Cement."

g. ASTM C-172, "Sampling Freshly Mixed Concrete."

h. ASTM C-23l, "Air Content of Freshly Mixed Concrete by the Pressure Method."

i. ASTM C-260, "Air Entraining Admixtures for Concrete."

j. ASTM C-494, "Chemical Admixtures for Concrete."

The technical representative shall have free entry to the plant to review the equipment used for mixing, dispersing, weighing, agitating and delivering concrete. Proper facilities shall be provided for inspecting materials, equipment and processes and to obtain samples of the ingredients and concrete. All tests and inspections will be conducted so as not to unnecessarily interfere with the manufacture and delivery of the concrete.

203.4 HANDLING AND MEASURING MATERIALS

Materials shall be stored and handled in a manner that will prevent degradation, segregation, contamination or intermixing of materials before measurement.

Scales for weighing aggregates and cement shall be beam or springless dial type, clean and operating within 1 percent accuracy for cement and 2 percent accuracy for aggregates.

All materials entering into the concrete shall be mechanically measured by weight except the air entraining admixture and water, which may be measured by volume.

203.5 MIXERS AND MIXING

Concrete may be furnished by batch mixing at the work site or by ready-mix methods.